WIDEPIX®

RasPIX

Version 1.0

Datasheet and User Manual

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General description

RASPIX is very universal solution of radiation camera with excellent connectivity and portability. The system consists of **RASPIX** interface with speed of up to 15 frames per second and single Timepix radiation imaging detector with sensor according to customer preference (standardly 300 µm thick silicon). The system can be extended attaching further Timepix layers forming a particle tracker or multilayer imager. The **RASPIX** can be equipped with pinhole or coded aperture. The system can be used in imaging applications (e.g. X-ray or neutron imaging) as well as for radiation monitoring where its ability to recognize individual particles, sort them to several basic groups (X-rays, electrons, neutrons, alphas etc.) and measure their energies is utilized with great advantage. If more than single detector layer is used then also direction of particles can be determined.

The **RASPIX** device is controlled and data are read-out via 100 Mbit Ethernet cable or via Wi-Fi connection. It can work fully autonomously in "stand-alone mode" being remotely controlled via internet. The functioning is configured via web based interface from any internet enabled device equipped with web browser including tablets or smartphones. The measured data are stored either locally (SSD card, USB flash drive) or remotely to network drive of external data server. The data can be downloaded using built-in FTP server. The device can be operated also locally in combination with personal computer equipped with Pixelman software (MS-Windows, Linux, MAC-OS).

Several **RASPIX** devices connected either via ethernet cable (power can be also provided over Ethernet) or WiFi can be grouped together forming the radiation monitoring network. The whole group is accessed using advanced application allowing setting of alarm levels for different radiation types, performing data logging and calculating various statistics, protocols and charts. Such network can serve as long time monitor of environment[1]. Several other devices developed in IEAP CTU in Prague and produced by **WIDEPIX**® company can be also part of such monitoring network.

Main Features

- Readout chip type Timepix
- Pixel size 55 x 55 µm
- Sensor resolution 256 x 256 pixels
- Dynamic range in one frame 11 082[2]
- Dark Current none
- Interface Wi-Fi, Ethernet
- Maximum frame rate 2fps (using Wi-Fi), 15fps (using Ethernet)
- Dimensions 98.3 x 68.8 x 37.9mm
- Weight 275g

[1] RasPIX is not certified dosimetric device. It serves as the first level indicator and monitor of radiation fields allowing identification of a radiation type. Radiation protection of people cannot be based on measurements of RasPIX.

[2] Dynamic range of final picture is theoretically unlimited; the only limiting factor is exposure time.

Device Parameters

Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units	Comment
T_A	**Temperature Range**	0	50	70	°C	
Φ	**Humidity**			60	%	Not condensing

Electrical Specification

T_A = 25°C, V_{CC} = 20V

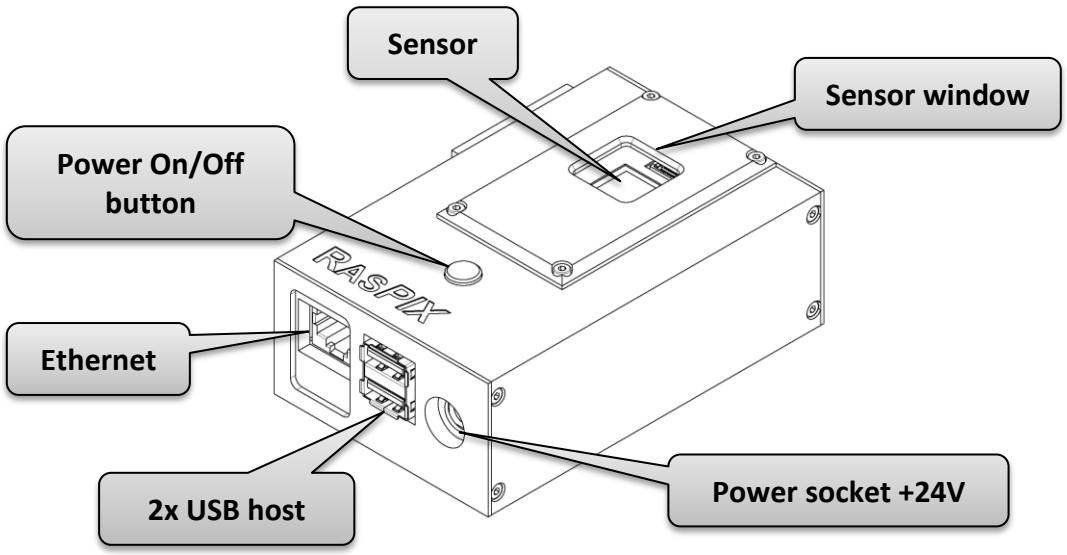
Symbol	Parameter	Min	Typ	Max	Units	Comment
V_{CC}	**Supply Voltage**	9.0	20.0	24.0	V	
I_{CC}	**Supply Current**			1.0	A	
	Vcc=12V, Charging, RasPIX ON		670		mA	
	Vcc=12V, Charging		300		mA	
	Vcc=12V, RasPIX ON		260		mA	
	Vcc=20V, Charging, RasPIX ON		340		mA	
	Vcc=20V, Charging		180		mA	
	Vcc=20V, RasPIX ON		160		mA	
P	**Power Dissipation**			9.0	W	
V_{BIAS}	Bias Voltage	3		200	V	
T_{accu}	Battery operation life	45		60	min	

Performance Characteristics

Symbol	Parameter	Min	Typ	Max	Units	Comment
f	**Frame Rate**					
$\mathbf{f}_{Eth}$	Frame Rate (UTP Ethernet)			15	fps	
$\mathbf{f}_{Wi\text{-}Fi}$	Frame Rate (Wi-Fi)			2	fps	
$\mathbf{T}_{READ}$	**Frame Readout Time**[3]		67		ms	

[3] During Readout time (or Dead time), no charge is collected from the sensor.

Device description



Ethernet RJ45

RJ45 is the main **RASPIX** communication interface meant for high speed data transfer via UTP Ethernet cable. **RASPIX** is connected to local area network and serves as web server with web browser as user interface.

USB

USB is auxiliary **RASPIX** communication interface. Two USB type A connectors provide ability to extend **RASPIX** with new functionality. Standardly it is used to attach Wi-Fi hotspot (Wi-Fi 802.11 b/g/n, 2,4 GHz, WPA/WPA2-PSK) allowing to use **RASPIX** with no cables attached and still monitor radiation environment (i.e. using mobile phone as display).

Power socket +24V DC

RASPIX accepts wide range of input voltages 9 – 24V, 1A. For this connection it uses standard 2.1mm power connector. **RASPIX** may be temporarily disconnected from main power, because it contains small internal accumulator, allowing **RASPIX** to run approx. 1 hour.

Power On/Off button with two status LED diodes

Button serves for starting and terminating **RASPIX** operation.

Power ON sequence

- Press button for 2 seconds and release.
- The green LED blinks with 1s period (for approx. 30s)
- When green LED stays on, **RASPIX** is ready for operation.

Power OFF sequence

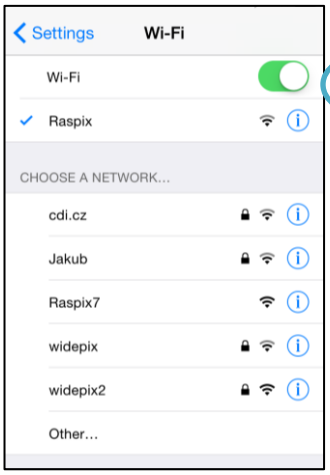
- Press button for 2 seconds and release.
- The green LED blinks with 1s period (for approx. 30s)
- When green LED stays off, **RASPIX** operation is terminated.

During power on/off sequence, holding button for at least 4 seconds will immediately terminate **RASPIX** operation.

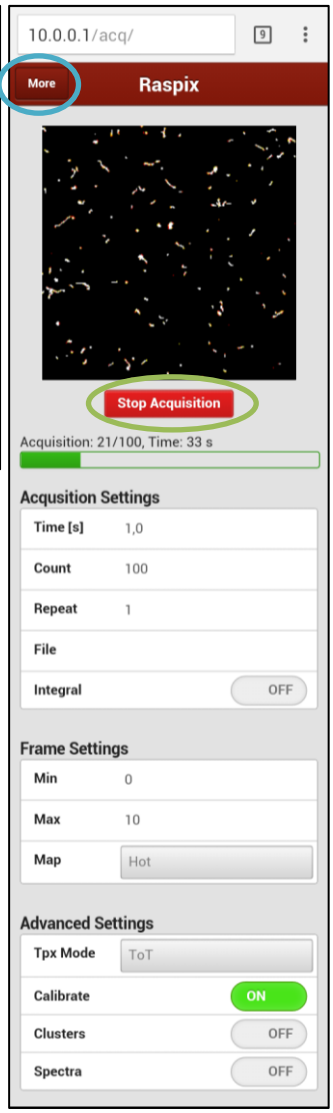
Controlling RASPIX via Wi-Fi or Ethernet

- Turn **RASPIX** on until it is ready for operation
- Use your phone and select appropriate network with SSID: Raspix[N] and connect to the network
- Type IP address 10.0.0.1 to address bar
- Use "**Start/Stop Acquisition**" button to start/stop measurement
- Use "**More**" button to navigate through web pages

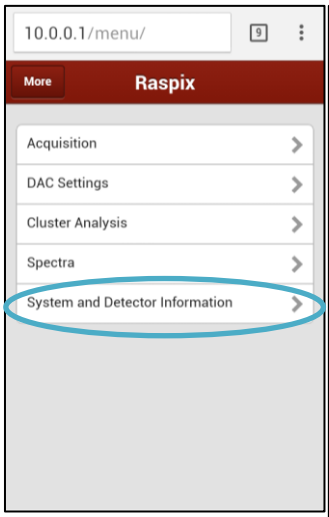
Connecting to Wi-Fi



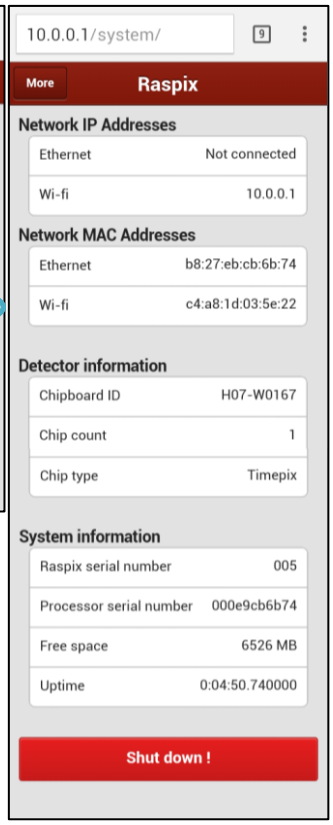
Acquisition page



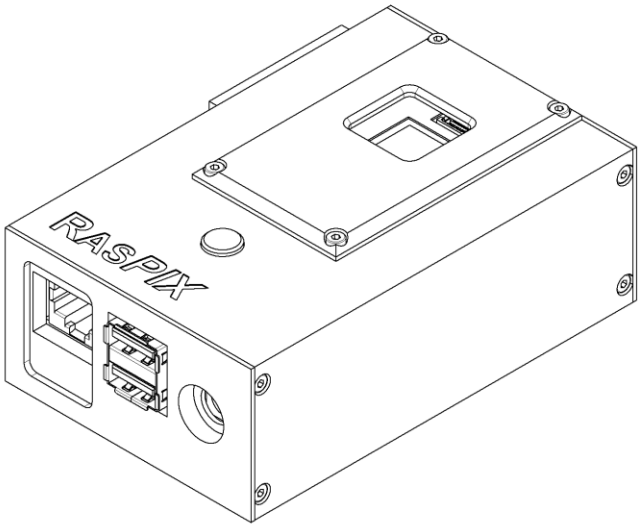
Menu page

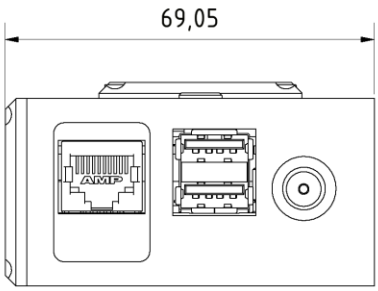


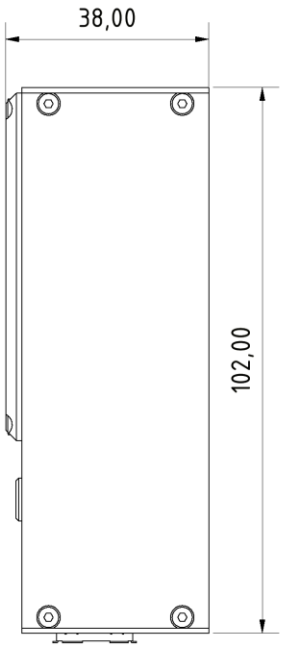
System page

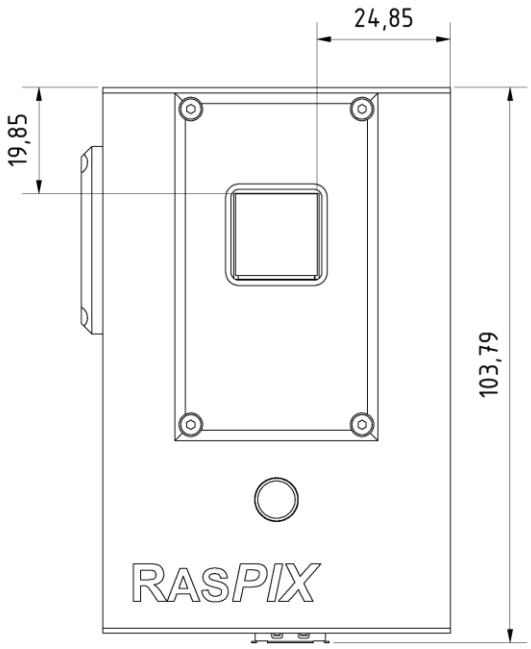


Mechanical Dimensions









All dimensions are in mm

Warning

- **Do not touch sensor surface!**

Instructions for safe use

To avoid malfunction or damage to your **RASPIX** please observe the following

- Do **not** expose to water, moisture.
- Do **not** disassemble. Wire-bonding connection of sensor chip may be irreversibly damaged.
- Do **not** insert any object into the sensor window.

Copyright

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